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| 10/626,988 | 07/25/2003 | Richard Louis Arndt | AUS920030189US1 | 4154 |
| 35525 | 7590 | 11/21/2006 | EXAMINER | |
| IBM CORP (YA) | | | CHRISTENSEN, SCOTT B | |
| C/O YEE & ASSOCIATES PC | | | | |
| P.O. BOX 802333 | | | ART UNIT | |
| DALLAS, TX 75380 | | | PAPER NUMBER | |
| | | | 2144 | |

DATE MAILED: 11/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/626,988 | ARNDT ET AL. | |
| | Examiner | Art Unit | |
| | Scott Christensen | 2144 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) ____ is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☐ Claim(s) ____ is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

Art Unit: 2144

DETAILED ACTION

1. This is a supplemental Office Action in response to the phone interview conducted on 11/14/2006.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description:

- A. CONSOLES 110 is not described within the specification,
- B. 800 from figure 8 is not described within the specification, and
- C. CONSUMER OPERATIONS 1112, MESSAGES (QP) 1114, and FLOW CONTROL 1120 from figure 11 is not described within the specification.

Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be

Art Unit: 2144

notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities: "Figur" appearing on page 29, line 2 is misspelled, and should read "Figure."

Appropriate correction is required.

Double Patenting

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 1 and 10 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 18 of copending Application No. 10/702,994. Although the conflicting claims are not identical, they are not patentably distinct from each other because they are both drawn towards a method or apparatus (system) for emulating multiple logical ports on a physical port. In

Art Unit: 2144

the case of claim 1, Application No. 10/702,994 discloses that the method is in a logically partitioned data processing system, and rather than providing a subnet management queue pair, it provides a single general services management queue pair and an aliased corresponding queue pair for each of the logical ports. The fact that the method is in a logically partitioned data processing system including logical partitions is interpreted as being intended use. Meanwhile, the difference between a single general services management queue pair and a subnet management queue pair does not render the two patentably distinct from each other. In the case of claim 10, the differences between the instant application and Application No. 10/702,994 are similar to that of claims 1 in both copending applications, except that the instant application refers to an apparatus as opposed to the system of Application No. 10/702,994. The differing terms do not render the claims patentably distinct, as the two terms, in the context used in the claims, can be interchanged in either claim and have no impact on the scope of the claim.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 101

6. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-18 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The instant claims may be directed towards software,

Art Unit: 2144

which is functional descriptive material, which per se is nonstatutory. The instant claim is directed towards an apparatus for emulating multiple logical ports on a physical port. Claim 10 may also be directed towards software alone, as "the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions." Even though the subnet manager queue pair is for a physical port and packets are received at the physical port, the physical port is not claimed as being part of the invention. Rather, the physical port is in communication with the apparatus, the apparatus comprising three components, each of which can be implemented in hardware or software. Thus claim 10 may be directed towards software alone, which per se is nonstatutory. Claims 11-18, which depend from claim 10, are rejected for the same. Typically, when functional descriptive material is recorded on some computer-readable medium, it becomes structurally and functionally interrelated and will be statutory. In this case, though, the instant specification discloses, "Examples of computer readable media include recordable-type media...and transmission-type media, such as digital and analog communication links, wired or wireless communications links, using transmission forms, such as, for example, radio frequency and light wave transmissions." Thus, amending the claims to record the software as claimed in claims 10-18 on a computer readable medium would not be sufficient to make the claims statutory, as transmission-type media, as disclosed in the instant specification, are nonstatutory as well. In this case, though, claiming the physical port as an element of the apparatus should make the claim statutory, as the claimed apparatus could no longer be reasonably be interpreted to encompass software alone.

Art Unit: 2144

Please refer to "United States Patent and Trademark Office OG Notices: 22 November 2005" for further guidance.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-5, 7, 8, and 10-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bannai et al. in US Patent Application Number US 2003/0206548 A1, hereafter referred to as "Bannai," in view of Buonadonna and Culler in "Queue Pair IP: A Hybrid Architecture for System Area Networks," presented on May 29, 2002 in the IEEE 29th Annual International Symposium on Computer Architecture, hereafter referred to as "Buonadonna."

With regard to claims 1 and 10, Bannai discloses a method and apparatus for emulating multiple logical ports on a physical port (Bannai: Claim 1 provides for a method of providing multiple services over a single physical port, where the method comprises a lookup table associating a set of logical port identifiers with a set of logical ports. Therefore, multiple logical ports are associated with (or emulated on) a single physical port) comprising providing a management interface for a physical port (Bannai: Paragraph [0035]. The management interface is associated with physical ports, and can manage the communications of the physical ports as well as the logical ports),

Art Unit: 2144

providing a plurality of logical ports (Bannai: Claim 1. As a set of logical ports is referred to in the lookup table, they are inherently provided), wherein packets intended for the plurality of logical ports are received at the physical port (Bannai: paragraph [0006]. As there is a physical port, and packets can only be initially received at a physical port, all packets that are intended for the logical ports are inherently received at the physical port), and providing an aliased subnet management interface for each of the plurality of logical ports (Bannai: paragraph [0029] and Figure 1 (314). The system port manager handles the creation and management of a logical port).

Bannai does not disclose expressly that the interface is a queue pair.

Buonadonna teaches utilizing Queue Pair IP for use in a system area network architecture (Buonadonna: Abstract).

It would have been obvious to a person of ordinary skill in the art to utilize Queue Pair IP, as taught by Buonadonna, with the logical port emulation of Bannai.

The suggestion/motivation for doing so would have been that "Queue Pair IP...combines the interface from industry proposals for low overhead, high bandwidth networks...with the well established inter-network protocol suite." (Buonadonna: Abstract) Further, "with modest hardware support, QPIP can perform as well as traditional inter-network protocol implementations at a fraction of the host CPU overhead." (Buonadonna: Abstract)

With regard to claim 3, Bannai as modified by Buonadonna teaches sending a packet from an aliased subnet management queue pair (Bannai: paragraph [0028]. As there are outgoing packets on the logical ports, the interface associated with the logical

Art Unit: 2144

port, the aliased subnet management queue pair, is able to send packets), and responsive to the packet being intended for a given logical port, looping the packet back to the subnet management queue pair for the physical port (Bannai: paragraph [0028]. Outgoing packets from the logical port must be forwarded to the physical port in order to reach the network. Therefore, the packet must be forwarded to the interface, or the subnet management queue pair that is associated with the physical port).

With regard to claim 4, Bannai as modified by Buonadonna teaches that the method further comprises responsive to the packet being intended for an external port, routing the packet to the physical port (Bannai: paragraph [0028]. An outgoing packet is intended for a port that is external to the system. The packet must be routed from the logical port to the physical port in order to reach any port external to the system).

With regard to claims 5 and 14, Bannai as modified by Buonadonna teaches providing a logical switch for the physical port (Bannai: paragraph [0006]. The packet forwarding device is interpreted as performing the function of the logical switch of claims 5 and 14).

With regard to claims 7 and 11, Bannai as modified by Buonadonna teaches that a hypervisor subnet management agent routes traffic for the plurality of logical ports (Bannai: paragraph [0006]. A hypervisor subnet management agent is being interpreted as being similar to the packet forwarding device, as the hypervisor subnet management agent seems to simply be code that allocates packets to one of the logical ports, which in turn would result in the allocation of a packet to one of the different virtual computers that a hypervisor would manage resources for.)

Art Unit: 2144

With regard to claims 2 and 12, Bannai as modified by Buonadonna teaches that packets are received at the physical port (Bannai: paragraph [0006]), and that if the packet is intended for a given logical port, looping the packet back to the given logical port (Bannai: paragraph [0006]. Though Bannai uses the term “forwarding,” the term “looping” is not distinct from forwarding.).

With regard to claims 8 and 13, Bannai as modified by Buonadonna teaches that the hypervisor subnet management agent transmits response packets on behalf of the plurality of logical ports (This is inherently in the teachings of the references. Any packet that has a response will be routed to the physical port through the forwarding device, which is the hypervisor subnet manager as in the claims. In the end, any response packets will be transmitted by the forwarding device on behalf of the plurality of logical ports, as the claim language does not require that the hypervisor subnet management agent actually generates the response.).

With regard to claim 15, Bannai as modified by Buonadonna teaches that an aliased manager queue pair sends a packet (Bannai: paragraph [0006]), and the logical switch, responsive to the packet being intended for a given logical port, loops the packet back to the subnet management queue pair for the physical port (Bannai: paragraph [0006]. Though Bannai uses the term “forwarding,” the term “loops” is not distinct from “forwards”).

With regard to claim 16, Bannai as modified by Buonadonna teaches that the logical switch, responsive to the packet being intended for an external port, routes the packet to the physical port (Bannai: paragraph [0028]. An outgoing packet is intended

Art Unit: 2144

for a port that is external to the system. The packet must be routed from the logical port to the physical port in order to reach any port external to the system. The forwarding device of paragraph [0006], which is similar to the logical switch, routes the packets).

Thus it would have been obvious to combine Bannai with Buonadonna to obtain the invention as specified in claims 1-5, 7, 8, and 10-16.

9. Claims 6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bannai and Buonadonna as applied to claims 1 and 10 above, and further in view of Fernandes et al. in US Patent Application Publication number US 2003/0236852 A1, hereafter referred to as "Fernandes."

Bannai as modified by Buonadonna teaches all of the limitations of claims 6 and 17 (see above for claims 1 and 10 rejected under Bannai as modified by Buonadonna) except that each aliased subnet manager queue pair is associated with a logical partition.

Fernandes teaches sharing a network adapter among multiple logical partitions in a data processing system. Each logical partition has an I/O adapter associated with it (Fernandes: Figure 1). The I/O adapter is interpreted as being the complete logical I/O adapter, meaning that it would have the interface associated with it, the interface being the manager queue pair.

It would have been obvious to a person of ordinary skill in the art to combine the individual logical I/O adapters of Fernandes with the logical port emulation of Bannai as modified by Buonadonna.

Art Unit: 2144

The suggestion/motivation for doing so would have been to enable a multi-partitioned machine wherein each of the partitions has access to a common network adapter or a common set of network adapters such that the number of physical adapters is less than the number of logical partitions to function (Fernandes: paragraph [0006]).

Thus, it would have been obvious to combine Fernandes with Bannai and Buonadonna to obtain the invention as specified in claims 6 and 17.

10. Claims 9 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bannai and Buonadonna as applied to claims 1 and 10 above, and further in view of whatis.com's article, "Infiniband," released June 5, 2001 on <http://www.whatis.com>, hereafter referred to as "Infiniband."

Bannai as modified by Buonadonna teaches all of the limitations of claims 6 and 17 (see above for claims 1 and 10 rejected under Bannai as modified by Buonadonna) except that each subnet management queue pair is an Infiniband queue pair zero.

Infiniband teaches using an Infiniband system for the I/O within a computer system (Infiniband: Paragraph 1).

It would have been obvious to a person of ordinary skill in the art to use Infiniband in the logical port emulator of Bannai as modified by Buonadonna.

The suggestion/motivation to do so would have been that Infiniband resembles a regular computer network, but is instead for I/O devices. Infiniband allows for greater bandwidth and almost unlimited expandability in computer systems (Infiniband: paragraph 1). By using the logical port emulation of Bannai as modified by

Art Unit: 2144

Buonadonna, devices on an Infiniband network could be divided into virtual devices, each with a logical port associated with it, where each device shares a single physical connection to the Infiniband network. The Infiniband queue pair zero is simply the manager for the physical port in an Infiniband network, so by implementing Infiniband in the logical port emulator, the subnet management queue pair would become an Infiniband queue pair zero.

Thus, it would have been obvious to combine Infiniband with Bannai as modified by Buonadonna to obtain the invention as specified in claims 9 and 18.

11. Claims 19 and 20 rejected under 35 U.S.C. 103(a) as being unpatentable over Bannai in view of Buonadonna and Infiniband.

A. With respect to claim 19, Bannai discloses a host channel adapter comprising one or more physical ports (Bannai: Abstract), a management interface for each physical port, wherein packets received at a physical port are placed in a corresponding management interface ((Bannai: Paragraph [0035]. The management interface is associated with physical ports, and can manage the communications of the physical ports as well as the logical ports. The packets are placed in the interface when they arrive through the physical port.), a plurality of logical host channel adapters (Bannai: paragraph [0029]), wherein each logical host channel adapter has at least one logical port (Bannai: paragraph [0029]), and a subnet management agent, wherein the subnet management agent receives packets at a management interface for a physical port, transmits response packets on behalf of the logical ports, and routes the packets to the intended logical ports (Bannai: paragraph [0006]. A hypervisor subnet management

Art Unit: 2144

agent is being interpreted as being similar to the packet forwarding device, as the hypervisor subnet management agent seems to simply be code that allocates packets to one of the logical ports, which in turn would result in the allocation of a packet to one of the different virtual computers that a hypervisor would manage resources for.

Responding to packets on behalf of the logical ports is inherently in Bannai. Any packet that has a response will be routed to the physical port through the forwarding device, which is the hypervisor subnet manager as in the claims. In the end, any response packets will be transmitted by the forwarding device on behalf of the plurality of logical ports, as the claim language does not require that the hypervisor subnet management agent actually generates the response.).

Bannai doesn't disclose that the management interface is a queue pair, or a queue pair zero.

Buonadonna teaches utilizing Queue Pair IP for use in a system area network architecture (Buonadonna: Abstract).

It would have been obvious to a person of ordinary skill in the art to utilize Queue Pair IP, as taught by Buonadonna, with the logical port emulation of Bannai.

The suggestion/motivation for doing so would have been that "Queue Pair IP...combines the interface from industry proposals for low overhead, high bandwidth networks...with the well established inter-network protocol suite." (Buonadonna: Abstract) Further, "with modest hardware support, QPIP can perform as well as traditional inter-network protocol implementations at a fraction of the host CPU overhead." (Buonadonna: Abstract)

Art Unit: 2144

Infiniband teaches using an Infiniband system for the I/O within a computer system (Infiniband: Paragraph 1).

It would have been obvious to a person of ordinary skill in the art to use Infiniband in the logical port emulator of Bannai as modified by Buonadonna.

The suggestion/motivation to do so would have been that Infiniband resembles a regular computer network, but is instead for I/O devices. Infiniband allows for greater bandwidth and almost unlimited expandability in computer systems (Infiniband: paragraph 1). By using the logical port emulation of Bannai as modified by Buonadonna, devices on an Infiniband network could be divided into virtual devices, each with a logical port associated with it, where each device shares a single physical connection to the Infiniband network. The Infiniband queue pair zero is simply the manager for the physical port in an Infiniband network, so by implementing Infiniband in the logical port emulator, the subnet management queue pair would become an Infiniband queue pair zero.

B. With respect to claim 20, Bannai as modified by Buonadonna and Infiniband teaches that the host channel adapter further comprises a logical switch associated with a given physical port (Bannai: paragraph [0006]. The packet forwarding device is interpreted as performing the function of the logical switch of claim 20), wherein the logical switch receives a packet from an aliased queue pair zero, and responsive to the packet being intended for a given logical port, loops the packet back to a queue pair zero for a physical port (Bannai: paragraph [0006]. Though Bannai uses the term "forwarding," the term "looping" is not distinct from forwarding.).

Art Unit: 2144

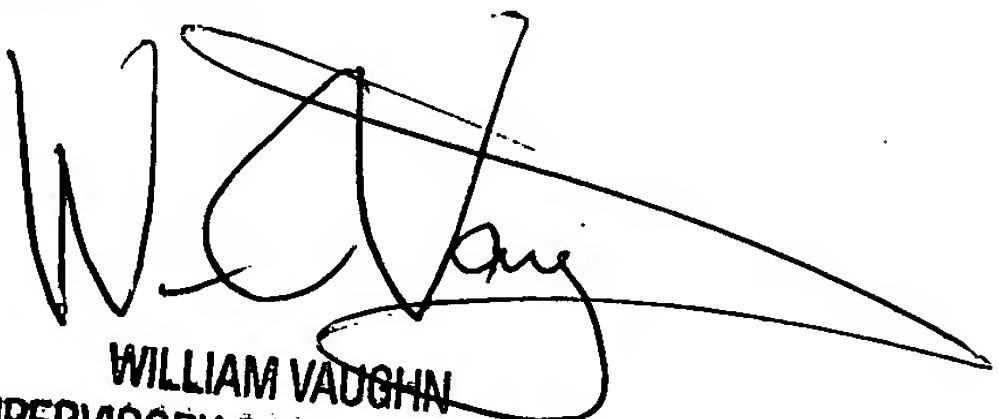
Thus it would have been obvious to combine Bannai with Buonadonna and Infiniband to obtain the invention as specified in claims 19-20.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott Christensen whose telephone number is (571) 270-1144. The examiner can normally be reached on Monday through Thursday 6:30AM - 4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vaughn William can be reached on (571) 272-3922. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


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TECHNOLOGY CENTER 2100